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'Stand Back and Watch Us': Post-Capitalist Practices in the Maker Movement

Abstract:

This paper examines the economic practices of maker spaces – open workshops which have increased in number over recent years and which aim to provide access to tools, materials, and skills for small-scale manufacturing and repair. Scholarly interest in maker spaces has been increasing across the social sciences more broadly, parallel to a growing interest in craft and making in economic geography. However, in an attempt to rectify the 'capitalocentrism' of much existing work, the paper examines the case of a workshop in Edinburgh, Scotland, through the dual theoretical lens of diverse economies and social practice theory. This conceptual approach sees the space as a new form of economic 'being-in-common', providing diverse and contradictory opportunities for post-capitalist practice. The paper draws conclusions regarding the limits and potential of such spaces for sowing the prefigurative seeds for a more inclusive, sustainable, and democratic urbanism.

Key Words: Making, Workshop, Diverse Economy, Post-Capitalism, Practice, Commons

Introduction

The aim of this paper is to provide a conceptually novel account of maker spaces[i], drawing from two key literatures in contemporary human geography – diverse economies and practice theory. These workshops are sites of peer production "brought into being by communities of makers in order to build, make, fix, craft, and engage socially with the world around them" (Smith, 2017: 131). As part of a wider 'maker movement', such workshops have drastically expanded in number worldwide over recent years (for example, see Nesta, 2015), giving rise to speculation – in both academic (Smith and Light, 2017) and popular literatures (Anderson, 2012) – that they can contribute to the transformation of contemporary means of production. This includes, for instance, the egalitarian implications of open source design, as well as their role in more sustainable, localised production processes. One widely debated example of the latter is the pro-environmental potential of access to 3D printing technologies in such spaces, which can obviate the unnecessary long-distance transport of manufactured goods, particularly in the form of spare parts (Birtchnell and Urry, 2013; Gebler, Schoot Uiterkamp, and Visser, 2014).

Questioning the binary framings of such spaces which is found in much literature to date, as either discursively charged sites of entrepreneurial design innovation on the one hand or anti-capitalist networked spaces on the other, this paper explores their role as crucibles for the normalisation of post-capitalist practice. By doing so, the burgeoning literature on practice theory – introduced in the next section – is employed to consider how specific practice constellations prefigure and contribute towards the construction of new post-capitalist economic realities. For this, I draw on conceptual tools developed by feminist economic geographers of diverse and community economies.

Complementing an emergent disciplinary interest in making, skill and creativity in human geography (Hawkins and Price, 2018; Carr, 2017), this combination of two normally distinct literatures – diverse economies and practice theory – allows us to better understand the contemporary community workshop spaces as fomenting experimentation with alternative forms of economic 'being-in-common'. The paper explores this by way of an ethnographic case study, revealing the study site as a diverse and contradictory site of post-capitalist alterity. The discussion and conclusions highlight two particularly salient areas: a) how the diverse economic provision of new material assemblages sows the prefigurative seeds for a (potentially) more inclusive, sustainable, and democratic urbanism; and b) how such prefiguration is both aided and constrained by the spread of competence in maker communities of practice.

Diverse Economies and Practice Theory: Towards post-capitalist practice

> *A lot of people believe in this idea of a second industrial revolution, [that] this is going to lead to everyone having their own distributed manufacturing… Maybe if you give it a thousand years it'll usher in a new fundamental economy. (Jacob, Interview)*

The diverse network of spaces which have become known as the 'maker movement' (Davies, 2017) find themselves caught in a web of contradictory impulses. They are variously portrayed as the herald of a newly entrepreneurial and globally-distributed phase of capitalism (Anderson, 2012) or as its opposite: a sustainable, grassroots anti-capitalist response to globalism, rooted in the local but networked across the world (Ratto and Boler, 2014). The 'innovation evangelism' (Irani, 2015: 800) characteristic of the former tendency has seen the rise of 'commons-based peer production' as a vehicle for maker-led accumulation, enabled by a world in which information and prototypes travel around the world more-or-less instantaneously (Browder, Aldrich, & Bradley, 2019; Giusti, Alberti, &

Belfanti, 2018). Rather than producing egalitarian transformations in production, however, this peer production instrumentalises the knowledge commons as a mere springboard for private capital accumulation – the 'communism of capital' as Bauwens & Kostakis (2014) phrase it.

On the other hand, exemplifying a widespread perception of hacker and maker activities as liberatory and anti-capitalist, Ratto and Boler (2014: 1), write that "the DIY ethos has seismically reshaped the international political sphere, as can be seen in ongoing global uprisings and the uses of media and communications within a "logic of connective action"…constituting new hybrid social movements and practices of horizontal, participatory, and direct democracy". To paraphrase one editorial, such spaces give 'us' the means of production, and we must now seek the revolution (Troxler & Maxigas, 2014). Through such discourses, these spaces appear to be subsumed by what Gibson-Graham (1996) famously termed 'capitalocentrism' – that is, an analysis situated in relation to capitalism as a system or overarching totality, eliding appreciation of the more plural processes of social reproduction which may be in question.

Through a lens of 'post-capitalist practices', this paper moves away from generalisations around an (anti-)capitalist 'ethos', discourse, or liberatory spirit amongst makers (Davies, 2017), instead examining the *practices* taking place in a contemporary community workshop and how these concretely perform new forms of economic 'being-in-common'. Recent years have seen a rapidly growing literature on 'practices' in geography and cognate disciplines (Everts, Lahr-Kurten, and Watson, 2011), particularly prevalent in studies of sustainable consumption (usually framed as 'social practice theory'; see Shove, Pantzar, and Watson, 2012).

A practice, as Reckwitz (2002: 249) notes, "is a routinized type of behaviour which consists of several elements, interconnected to one another: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of

understanding, know-how, states of emotion and motivational knowledge". Shove et al. (2012) have simplified Reckwitz's schema into three major 'elements': materials, competences, and meanings. Materials, here, comprise "things, technologies, tangible physical entities, and the stuff of which objects are made", meanings relates to "symbolic meanings, ideas and aspirations", while competence "encompasses skill, know-how and technique" (p. 14).

A practice-oriented perspective elaborates a temporally and spatially more complex sense of sustainability than would be provided, for instance, through examining immediate tonnes of carbon or waste reduced by a particular activity or process. As Shove (2010: 1273) has put it, "if there is to be any effective response [to the ecological crisis], new forms of living, working and playing will have to take hold across all sectors of society." By necessity, this is a complex, temporally diffuse, and political undertaking, which calls for thinking through how less sustainable social practices wither away and more sustainable ones take their place, at various scales. We are forced, that is, to look for, and foster, living alternatives to a way of life which is undermining its own basis of existence.

Rather than focusing on beliefs, attitudes, or behaviours, practice theorists emphasise the role of the everyday in sustaining environmentally destructive tendencies (Meyer and Kersten, 2016). By doing so, this work foregrounds the often 'banal' and unconscious normalisation of resource use, similar to the manner in which Arendt (2006[1963]) explored the 'banality of evil'. Thus, in recent years, practice scholars have looked at norms around room temperature expectations, clothing, showering and bathing, amongst others, and the resource implications of changes in such practices over time.

However, given the tendency towards an isolated and apolitical examination of norms in such domestic practices (Evans, 2018), there have been increasing calls to broaden and deepen the empirical remit of practice approaches. Chatterton (2016: 403), for instance, argues that scholarship on pro-environmental transitions has rarely captured "the practices and motives of projects that are committed to a future where features of capitalism are named, confronted and reversed." In the face of this tendency "to isolate everyday practices from the wider socio-technical systems that service them" (Köhler et al., 2017: 29), Köhler et al. (2017: 24) have called for greater insight into how "the study of transitions and everyday practices [can] be connected with CSOs [Civil Society Organisations] and social movements" (see also Yates, 2015; Schmid, 2018).

This paper addresses the under-representation of such approaches in the literature on social practices by engaging with work by radical and critical geographers on ethical economic communities and 'community economies', as, for instance, influentially outlined by J.K. Gibson-Graham (1996). Feminist and post-structural perspectives on work and the economy are central to this literature, emphasising that wage labour and capitalist enterprise – the dominant focus of much capitalocentric scholarship – comprise just the tip of the iceberg of social reproduction, which is actually the product of a diversity of nonmarket gifts, volunteer work, commons, co-operative forms of production, criminal economies, and much more. The diverse economies approach thus sensitises us to variegation, plurality and economic difference in the here and now, with Gibson-Graham et al. (2016: 706) highlighting a performative choice to be made "as to whether the capitalist economy is represented as a force of nature or as a precarious assemblage of powers, practices, technologies and discourses that must be continually reconfigured and performed."

In its precarious performativity and revalorisation of the unexceptional and everyday, this post-structural re-reading of economic geographies recasts the 'economic system' in a manner complementary to theories of practice, not least through a shared mistrust of both methodological structuralism and agential individualism. Rather than closed and all-encompassing, from the anti-essentialist and pluralistic perspective of the diverse economies approach, capitalism becomes "an always vulnerable and incomplete social process of colonization and discipline", one which can be struggled against by "proliferating movements that enact life-affirming value relations both outside and against the values of capital" (Miller, 2015: 366).

Opposed to competitive, isolationist individualism, these life-affirming relations relate to constructing an economy founded on our 'being-in-common' – or originary interdependence – drawing explicitly from the work of Jean-Luc Nancy (Gibson-Graham et al., 2016; see also Nancy, 1991). This requires "daily practices of learning to live differently" with others, as we "encounter new possibilities of community" (Gibson-Graham, 2003: 49). While freeing the terms 'community' and 'local' from their connotations of powerlessness and irrelevance, Gibson-Graham highlight how collective action in the diverse economy can provide a viscerally and affectively empowering alternative to the mere location of the subject as an individual capitalist citizen.

While Gibson-Graham's proposed framework engages quite broadly with the term 'alternative' in its exploration of economic diversity beyond capitalocentrism, the current paper works to further distinguish understandings of alterity and alternative practices. Rather than taking the community workshop's status as an assemblage of 'alternative' post-capitalist practices as a given, with the obvious risk of simply constructing a new hard binary in relation to capitalism, it does this by means of a typology utilised by Jonas (2010) and adapted in Table 1. This typology allows us to identify with more precision the plural and qualitative distinctions amongst 'post-capitalist' practices tending away from capitalist growth logics. For instance, while the category of 'alternative-oppositional' deliberately and pro-actively challenges the mainstream, participants constructing the 'alternative-substitutional' may do so in a far less self-conscious manner.

Of course, these categories cannot be taken as static, universal, or mutually exclusive. As Jonas (2010: 4) states, "alterity is itself diverse, context-dependent and, above all, geographically specific" and thus future work should investigate and reveal "the tensions and contradictions underpinning the emergence, growth, contraction, co-optation and/or proliferation of alternative economic and political spaces" (p. 5).

Alternative-additional	Alternative-substitutional	Alternative-oppositional
Practices or institutions which are additional, alongside, or complementary to the social order. **E.g. Community credit unions as alternatives to private banking.**	**Coping mechanisms replacing failures or lacunae in the current systems.** **E.g. Self-help networks during times of economic hardship, such as Argentina's post-2001 networks of recovered factories.**	**Alternatives deliberately established to oppose mainstream institutions and practices.** **E.g. The nexus of urban squatting, radical social centres, and other anti-capitalist spaces organised to challenge private property.**

Table 1: Typology of alterity, after Jonas (2010)

Given this initial outline of the theoretical underpinnings of the paper, I will now introduce the study's methodology, before elaborating findings related to the construction of space for economic being-in-common.

Methodology

A further confluence between the diverse economies and practice approaches is their emphasis on the methodological importance of the thick description of social life. Schatzki

(2012: 24), a leading contemporary practice theorist, has underlined the importance of ethnographic methods for understanding practices, arguing that "there is no alternative to hanging out with, joining in with, talking to and watching, and getting together the people concerned." In this spirit, the remainder of the paper draws from a broader 'enactive' ethnographic study of community workshops in Edinburgh, Scotland, beginning in the winter of 2015.

This paper examines one of these spaces – the Edinburgh Hacklab, founded in 2010 – the city's first hackerspace and, until just prior to the study, the city's only workshop openly accessible to the public. Located on the ground floor of a larger arts complex, the Hacklab had 50 members at the time of research, and was comprised of three main spaces: a central meeting and hang-out area, with a clean zone for electronics to one side; a smaller workshop space for 'dirty' construction work, with a laser cutter, pillar drill and selection of hand tools; and a large storage room for members' ongoing projects, which also housed the Lab's 3D printer.

Inspired by apprenticeship and laboratory ethnographies (Patchett, 2015; Powell, 2007), and foregrounding 'observant participation' over 'participant observation', the data presented are drawn from three overlapping sources: ethnographic observations from field diaries; formal and informal interviews with current and past Hacklab members; and 'netnographic' data comprising hundreds of posts across five years of the Hacklab's discussion list (labelled as 'DL' throughout). Following thematic analysis, these plural methods allowed engagement with both practice-related stories and reflections from participants (Hitchings, 2012), as well as the more-than-discursive or taken-for-granted elements which can be elided by qualitative interviewing.

The enactive component of the study included attending community open evenings to undertake a construction project requiring tools such as a 3D printer, laser cutter, and various hand tools. As such, the author was taught new skills by participants, and was subsequently able to share learnings with newcomers to the space. Regarding 'netnography', the need for researchers to utilise digital fora such as mailing lists is increasingly crucial in contemporary organisational studies, especially given the importance which such tools are given by participants. Involvement in this respect was more passive, given the high level of expertise already available on the list, entailing only project-related updates and requests.

Attesting to the broadly recognised demographic homogeneity of spaces like the Hacklab, particularly in terms of gender and age (Davies, 2017), the majority of participants were males aged between 20 and 40. All were over the age of 18 and the study received institutional ethical approval. Names have been changed, unless anonymity was expressly not desired by participants.

Being-In-Common: Organising a Post-Capitalist Workshop

In this section, I problematise capitalocentric readings of the open workshop movement by outlining the diverse economic basis of the Hacklab. Registered as a charity, the Edinburgh Hacklab operates in a *de facto* mutualistic and co-operative manner. As such, most regular participants are contributing members who each have an equal vote when they meet annually at the charity's AGM. While directors are elected to facilitate the running of the space, day-to-day decision-making is distributed, made consensually amongst all members where possible or, more commonly, through what Davies (2017) elaborates as 'do-ocracy'. The latter denotes when decision-making priority goes to those who will actually get things

done, or who are actually active in working to solve a certain issue, rather than merely discussing it, and is most frequently facilitated through the e-mail discussion list:

> *There's five directors…but they don't tend to make decisions, they'll always give it to the members to make the decision, so basically we argue about it until we come up with something, or someone's like 'let's just fucking do this' and you'll go 'alright'...it's all done on the mailing list…there's so many people that you can't really have a meeting…it just kind of happens (Ben, Interview).*

While the concept is open to problematisation – for instance, regarding the constellations of practice which result in specific demographics and groupings being more or less able to 'do' – the practicalities of do-ocracy are deemed to benefit a space which operates through a lack of formal hierarchy. Day-to-day interactions are thus infused with the mutualism, friendship, trust, and gift relations which such an organisational approach requires. As Edward noted in an interview:

> *These are people who are into open source philosophy and things like that, about coding, sharing and making this stuff free. It's not really filled with greedy capitalists… Spaces like the Hacklab and libraries have an important role, because they make visible those norms in society which mean that these things can function very cheaply and easily and very amicably.*

Contrasting with innovation-centric characterisations of the maker movement as a site for the development of commodities, the majority of members, as well as the majority of

weekly open night attendees, do not use the space for commercial ends. While most usage is for personal projects – development of items for personal use, as well as educational, artistic, and other non-market endeavours – there are "*maybe five or six people who are using the Hacklab to make stuff to sell or making things for work and that sort of thing*" (Ben, Interview; this comprised about 10% of the membership at the time of research). The latter had included, for example, two of the workshop's original founders, who had used the space as a base for their robotics start-up company, an Arduino-based electronics start-up, and someone using Hacklab equipment for the manufacture of bespoke composite skis. Here, then, in terms of the typology of alterity introduced above, we can see the Hacklab's role as 'alternative-additional', acting as an alternative form of business premise or space of work and entrepreneurship within the status quo.

Importantly, the commercial/non-commercial or capitalist/non-capitalist use of the Hacklab is carefully orchestrated, and is pragmatically viewed as symbiotic, rather than oppositional or problematic. Giving insight into the complexities of dissociating alternative-additional from alternative-oppositional, for example, the founder members and owners of the aforementioned robotics start-up helped to fund the purchase of some of the workshop's original tools and equipment. When that company closed, the equipment remained at the Hacklab for the free use of the community. Similarly, commercial use was cited by participants as being of occasional benefit to non-commercial users, when people using the space for commercial reasons were seen to have a greater interest and urgency in keeping more complex technologies and equipment in working order. To maintain this symbiosis, however, an order of priority is written into the organisation's founding constitution whereby non-commercial use takes priority at all times. This reflects the Hacklab's primary

purpose as a shared space “for people who mess around with technology for fun” (Hacklab Website).

There is no payment levied on visitors to use the majority of equipment on weekly open nights, meaning that it operates as a free and open resource for a wider community of users. However, to use the more energy and resource-intensive tools, such as 3D printers and laser cutters, fees are applied to cover costs, collected through honesty boxes, with non-members paying more than members. Volunteer labour facilitates non-member use, with members or regular attendees giving their time on an ad hoc basis to teach newcomers how to use equipment for the first time.

Practices of thrift, repair and re-use – which can be grounded in all three accounts of alterity – underpin the economy of the workshop in a number of forms. Schmid (2019: 231) has noted the ambiguity of repair practices as providing both a space away from ‘capitalist valorization’, while also being firmly ‘integrated into market economies’. The Hacklab cultivated de-commodified practices of repair and recuperation, being primarily populated with tools which had been donated, gleaned from waste streams or the street, or obtained as gifts from businesses or educational institutions which no longer needed them. The material practices going on whilst using these tools also frequently involved converting something unwanted into working and valuable objects, through repair or reconstruction. Ingenuity in this was highly regarded, and, during fieldwork, included the deconstruction and repair of a discarded dehumidifier which had been found on the street; the construction, out of catering detritus, of a rocket mass stove for workshops to be delivered in the ‘Jungle’ migrant camp in Calais, France; and a small-scale wind turbine constructed out of otherwise unrecyclable industrial printing waste. Given the focus on ‘spectacular’

technologies like 3D printers and laser cutters in much writing on contemporary workshops, the centrality of this material revaluation of the mundane is notable, underpinned by a principal emphasis on 'alternative-oppositional' gift-based and sharing transactions and practices.

Further examples of a plurality of non-commodified exchange practices abound, including a prominent 'Free Stuff' stand located by the entrance for members and visitors to help themselves to unwanted hardware, books and, on occasion, food. Blurring norms of public/private property ownership, many tools are donated by people who either don't use them anymore, or don't have the space for them at home (participants coined the illustrative portmanteau '*storenate'* – an amalgamation of storing and donating – to describe this practice). When outright ownership of a particular technology is not assigned to the Hacklab community, an individual can at any point in the future reclaim their equipment when needed. The latter occurs from time to time, on an informal understanding that notice will be given so that the item can then be crowdfunded and replaced by the sub-set of users affected.

When new or particularly capital-intensive equipment – like the laser cutter and 3D printers – are acquired, the Hacklab informally 'crowdfunds' significant cash sums amongst its community, with no expectation of direct ownership or guarantee of privileged use of the particular piece of equipment. Rather, the equipment becomes a common good. As such, when these tools fail, members give freely of their time and expertise to get them back up and running.

Given the context provided in this section, we can begin to see how these spaces build "social and spatial formations [that] inhibit the accumulation of surplus value,

individualization, commodification, and enclosure and [instead] build commons, socially useful production and doing" (Chatterton and Pusey, 2019). A diverse economic space is created, founded on the normalisation of everyday practices of mutual ownership and use. Volunteering is the primary labour form underpinning this, while gifts, gleaning, and crowdfunding are the predominant means of exchange and acquisition. The next section focuses on the intersection between such prefigurative practices and the construction of this common infrastructure.

Materials: The intersection of infrastructure and everyday life

If making is a distributed process, emerging between a skilled practitioner, the tools he or she uses, and the material being worked on (Ingold, 2013), then access to (and competence in using) different tools and infrastructures shifts the curve of possibilities, creating "configurations that would not otherwise exist" (Smith and Stirling, 2016: 16). Writing of prefiguration through material provision, Schatzki (2014: 27) notes that "the emergence of a practice-arrangement bundle can also be tied to the production and introduction of particular material entities and arrangements. A new bundle can emerge when the built environment is significantly altered…" He uses two simple hypothetical examples to clarify his point:

> The construction of a lake in a park leads to evolved recreational bundles there, just as the construction of recycling facilities in a town where none existed before leads to new activities amid old and new arrangements. (Ibid: 41)

A common theme raised by participants was the spatial observation that public workshops alter the infrastructural and material capacity of a given community, providing valuable space for diverse maker practices which otherwise wouldn't exist. As noted by one participant at the Hacklab:

> *Somebody was pointing out that the little workshop that we've got, you know the room isn't big, but it's one of the only open access workshops in Edinburgh. Any size…there's nowhere else to go, so how is that? (Ben, Interview)*

Jacob, who had moved between the major Scottish cities, and, most recently, lived in a capital city in southern Europe, remarked that with the seemingly exponential spread of maker spaces of numerous kinds over recent years, the convenience and accessibility of this infrastructure is rapidly changing:

> *We're getting to the point where you can go to pretty much any major city and find a maker space. I've moved twice in the last year and each time I've come across a brand-new maker space, you know. And there's two other maker space-like places [here], but they're more along the social enterprise side of things.*

Like the other workshops encountered by Jacob, the Hacklab is located in, or near, the densely inhabited centre of a large city. This common material-spatial theme was explained as being most relevant because participants, who often also lived in or around the city centre in rented accommodation, lacked any spare space of their own for maker practices, or for storage of tools and materials. Discussion of 'storenating' in the previous section speaks to this impulse, alongside the spatial limitations of contemporary urban life. As it was

put, they had no access to a ‘garden shed’ where many similar activities would have taken place in the past (and perhaps still take place in less densely-populated rural and suburban areas):

> *Living in an apartment I didn't have enough space really to do these kind of things... Our generation especially, we don't have access to gardens, we don't have access to spare rooms, we don't have access to garden sheds, and we also tend not to have the space or the finance for the kind of standard tool kit that your kind of garden tinkering person would've had…but the Hacklab does. (Edward, Interview)*

For Edward, however, the evolution of spaces like the Hacklab is not a like-for-like replacement for what would previously have taken place in people’s garden sheds, or a reaction to precarity in contemporary urban life. Instead, by facilitating a shared material commons, it is an active improvement on, and prefigurative challenge to, a tendency towards individualism:

> *To me, it's more awesome than that kind of garden shed mentality where everyone has their own tools… I mean you always borrowed tools from your neighbour so there was a community around that always, but this means that all those tools are in one place, so by pooling that together you can have cooler stuff.*

There were occasional exceptions to this imperative for sharing city-centre space. One of the Hacklab founders, for example, uses the space socially and out of personal preference, rather than necessity. However, he still emphasised the importance of this factor for others:

> *Most of the stuff has been either brought in by a member or, to be honest, a lot of members' partners are delighted to have finally gotten rid of all the crap out of their house. Particularly people living in flats… its important, for me, to have facilities like this in the city, it's an incredible resource. (Harry, Interview)*

Grappling with a criticism of existing practice literature, which argues that it neglects "the processes that like behind their [i.e. practices'] creation" (Denegri-Knott, Nixon, & Abraham, 2018), we zoom out to see that Hacklab members navigate issues of communal workshop access in an urban environmental context which for decades has been characterised by dynamics of wage stagnation, privatisation and enclosure (Hodkinson, 2012). This role has been discussed elsewhere, for example, in relation to community gardens, which "[reconstruct] the commons, generating new public spaces in which multiple values and alliances may be formed" (Stephens, 2016: 194).

Furthermore, average home sizes have long been smaller in the UK than in the US, Australia, or the rest of Europe, with roughly half of respondents to a 2011 study by the Royal Institute of British Architects noting that they didn't have enough space for the furniture they own (RIBA, 2011). While the resource implications of dense urban living in smaller spaces are hotly contested, the rise of the makerspace appears at least partly tied up with the material affordances of space-poor apartment life. Participants thus perceive that the workshop's function would previously have been more affordably provided by garden sheds or spare rooms, with the Hacklab here functioning both in an 'alternative-substitutional' and 'alternative-oppositional' role.

Aside from spatial limitations, a related barrier to individual access to the necessary tools for maker activities, is the expense of provision of such materials:

> *You've got access to all the tools which is nice, so having the laser cutter which we wouldn't be able to afford as a small company with no budget you know, so we're doing it on a budget of nothing… There's access to tools and equipment that you wouldn't otherwise get. (Ben, Interview)*

> *[We aim to] provide access to better facilities than we could each have at home, as well as opportunities to collaborate, learn, and socialise. (DL, February 2012)*

Many of the tools and materials which are provided in workshops like the Hacklab are uncommon in daily life, existing as remnants of older (or near-extinct) practices – in the case of recovering disused machinery and product repair – or being too expensive for one person to purchase alone. Furthermore, as a non-profit entity run on a tight budget and providing shared facilities for often low-income participants, the materials used in these workshops – the stuff from which objects are made, and the tools used to work on them – were not just shared, but were largely re-used and/or taken from the waste-stream.

By broadening the focus on individual practices, it is thus possible to parse how domains of social and economic practice intersect and become interlinked across time and space, with the Hacklab emerging out of a confluence of norms related to house size and house building, speculative finance and rising property prices, stagnant wages, and precarity amongst the demographic most likely to engage with the Hacklab (males between 20 and 40 years old). Given that “all practices are involved in a variety of relationships and associations

that extend in both space and time and form a texture of dependencies and references" (Nicolini, 2009: 1407), there is always a need to contextualise, in this way, from site-specific practice performances to their broader constellations (Hui, Schatzki, & Shove, 2017).

Competence: Crucibles of Know-how

This section explores the workshops' less tangible role as a crucible of knowledge that has key implications for how we consider the diffusion of post-capitalist practices. While the persistence of a practice "requires the endurance of material arrangements", such as those discussed in the previous section, competence in performance calls for "the stabilization of the practical understandings through which people perform certain bodily actions when carrying out the actions that compose particular practices… People's bodily repertoires, which are coordinated with these practical understandings, must also be stable" (Schatzki, 2014: 40). To take an example of competence provided by Watson and Shove (2008: 75), "in the hands of a novice, an assortment of plumbing fittings represents just so much metal. For someone skilled in fitting pipes together, these same materials figure as necessary resources for the task ahead."

While, in its early days, formal workshops on soldering and other hardware activities had been organised at the Hacklab on a somewhat regular basis, competence was usually built more informally, through networking and 'legitimate peripheral participation', as Lave and Wenger (1991) have described it. It is possible that this lack of structured workshops may impede structured entry points to the space, for the less confident or competent. Certainly, exclusions or hierarchies of skill can emerge in such situations, with one participant – Edward, an IT professional in his early 30s – reducing his involvement in the space due to his

perception that he didn't have enough of the right competences (for instance in electronics and hardware hacking) to fit in or contribute adequately.

Newcomers to a Hacklab open night would commonly spend time peripherally observing other people's projects, particularly when they wished to learn how to use equipment such as the laser cutter, 3D printer, or CNC mill. Such occasions provided an opportunity for outsiders to cross the boundary into the space, gain familiarity with how it operates, while becoming acquainted with who amongst the 'insiders' might have the particular skills required to move a given project to completion.

Generalisations are difficult to make, abstracted from particular instances, with more or less formal 'sub-communities of practice' in a permanent flux of assembling and disassembling. A case of this peer-to-peer learning was recounted by Jacob:

> *I'm really a very poor programmer you know, I'm slow, inefficient and I don't know what I'm doing. I spent a month and a half programming, making this little program... 'cause I don't know what I'm doing. And I was talking to Sam, he's a sysadmin programmer type, and he's like 'oh that's interesting' and 30 minutes, there you go, and it worked better than my programme by a long shot. Managed to eliminate like ten operations. (Jacob, Interview)*

Shove et al. (2012: 66) write of "the significance of communities and networks as crucibles in which new arrangements are formed, as containers that limit their diffusion and as conduits through which they flow." A key element of the sharing and developing of such competence within community-based workshops, such as the Hacklab, is the possibility for

mutualistic learning embedded in community. Further to the provision of materials and tools which could otherwise be difficult to access and use, a major attraction for participants was accessing the knowledge and interpersonal connections which such spaces house and facilitate:

> *The hackspace was important because there was a community, because I was new to the city, I was interested in kind of meeting people…And also the expertise that was there. Just kind of like brainstorming and thinking through different options from people who'd done similar or dissimilar sort of things before but had some advice and [were] interested in what was going on. (Edward, Interview)*

> *I'm really eager to join the community, learn new skills, share new ideas and to have a lot of fun. (DL, August 2012)*

> *I work in software security so have a decent level of software knowledge but my electronics-fu*[ii] *is weak. Hoping to join the lab and work on upping my electronics skills... (DL, March 2013)*

These statements make clear that the desire to access particular know-how was more than a utilitarian one, being entangled with notions of potential friendship, interest, enthusiasm, and fun. As divisions between 'productive' activity and just hanging out with friends were blurred, more established participants recounted the importance of this informality and openness to transcending normal disciplinary and material boundaries. The Hacklab is a space of collective problem-solving, with participants remarking how projects sprung from chance encounters and creative convergences. On one occasion, an artist wandered in,

hoping to turn an idea for an installation into reality, and ended up working alongside a software engineer. On another, a textile design graduate applied his yarn-spinning knowledge to help someone braid electrical wire for amplifiers.

This reflects a common theme, foregrounding the de-centred, community-oriented nature of knowledge acquisition in such spaces. However, there is a further temporal aspect to competence in maker practices which must be noted, whereby "one round of DIY has implications for what might be tackled next and for the confidence, or otherwise, with which new projects are approached. As a result, practitioners' 'careers' – both individually and collectively – determine related forms and types of production and consumption" (Watson and Shove, 2008: 72).

The 'maker' career of participants, albeit reinforced and strengthened by such involvement, rarely started with involvement in a community workshop. As Hargreaves et al. (2013: 406) note, the practices which someone "currently 'carries' will shape the kinds of practice she encounters in her daily life, just as they will shape her perceptions of, and ability to take up, new practices." The workshop acts as a spatial focal point for such practice uptake, capitalising on pre-existing know-how picked up in other venues, such as the home, or school, or earlier in life, as part of a previous practice career. Speaking to the issue of who gets to participate in particular practices, however, the stories which emerged reflected the space's skewed demographics and the deeply embedded gendering of the most common category of making at the Hacklab – electronics-related hacking:

> *I've always been interested in electronic stuff. My dad was an electronic engineer so there was stuff around. From about seven or eight I think,*

playing with LEDs, making LEDs blink and stuff like that you know. (Ben, Interview)

My dad was a technical person – a lift engineer – so he's often working with lift assemblies, power blocks and such things, and I used to travel with him extensively during my younger years. I had that osmotic input. (Stewart, Interview)

I remember sitting in the computer repair shop with my Dad paying a repair bill after I took the family PC apart and could not get it back together again…I've always liked understanding the mechanics of how things work, from computers/electronics to trains. (Kevin, Interview)

Given the presence of eclectic and transdisciplinary endeavours, from weaving to wiring, for example, or sculpture to restoration, it appears fundamental that competence of one type tends to breed confidence in another, and for more traditional 'craft' skills and software techniques to complement each other in such developments of practice. Querying distinctions between 'traditional' and 'contemporary' making, such questions of competence and know-how have significant implications for "the socio-spatial relations and dynamics within which transitions evolve" (Coenen, Benneworth, and Truffer, 2012: 969).

While much of this learning took place face-to-face, whether between members or on the workshop's open evenings, a vital and active resource for this was the online discussion list, which operates as a forum for problems to be posed to a wider audience and potential solutions discussed. As described by Ben, "*There's shit loads of people on the mailing list that you just never see, [but] they're quite active."* In this sense, the Hacklab forms a

distributed web of competence. Queries addressed on the list include everything from discussions about whether a broken PC hard-drive could be fixed by putting it in a freezer, how to re-flow (and thus repair) solder on a circuit board in a home oven, and the pros and cons of MIG and TIG welding, to building a low-cost photographic jig for research on plants at a botanic garden, or inserting conductive filament into clothing to produce e-textiles.

Geographically, as Lave and Wenger (1991: 98) note, the term 'community' in 'community of practice' doesn't necessarily imply **"**co-presence, a well-defined, identifiable group, or socially visible boundaries. It does imply participation in an activity system about which participants share understandings concerning what they are doing and what that means in their lives and for their communities." Hitchings (2014: 103) too notes that "it may not always be those living nearby who influence practices… We might therefore benefit from conceptualising these collectives in ways other than those defined by geographic proximity." While in the private sector, 'leaking' of information outside of the organisation can be a problem, and is often actively discouraged (Brown and Duguid, 2001), construction of a knowledge commons is facilitated in the Hacklab, through wikis, online tutorials, and other digital platforms. As Brown and Duguid (2001: 207) note, this can be mutually beneficial, as "the lines that let knowledge leak out, also let it flow in". Digital fora such as the mailing list, however, are extremely conducive to what Duguid (2005) describes as 'leaky' knowledge, but less so for the 'sticky' knowledge which travels less easily by means of words and diagrams. Though written material in 'wiki' form on the Hacklab's website could explain some fundamentals, explicit instruction can only be of a certain amount of use, with people pointed towards particularly skilled individuals for more detailed face-to-face instruction. For this reason, spaces like the Hacklab are often spoken of as analogous to past institutions which stored and/or filtered knowledge, like libraries and guild houses:

> *An interesting…analysis that I read is it's actually a revival of the medieval guild movement, but in a different way. Cos the guilds acted to contain knowledge, and not let it out…also guilds had guild houses. (Jacob, Interview)*

> *It's a space where people can share those tools and come together to use those tools and that's a fantastic library-like resource for the 21st century I think. (Edward, Interview)*

Focusing on its role as a crucible of knowledge, this section has shown the community workshop to be a space of "for the development, maintenance, and reproduction of knowledge" (Brown and Duguid, 2001: 202). Through material competence, what may seem immediately irrelevant or frivolous has implications for future practice, sedimented in embodied understanding. As Watson and Shove (2008: 86) note, "this temporal aspect is vital in understanding the careers of individual consumers and the trajectories of the practices they collectively reproduce and transform."

Discussion

At the nexus of a growing interest in practice, post-capitalism, and diverse economies in geographical research, the Hacklab serves to illustrate "more resourceful ways of living (incorporating socio-material economies of thrift, sharing and generosity) that reanimate the maligned industrial city as a site of geographical enquiry" (Carr, 2017: 646). The paper highlighted the pragmatic construction of a common economic space, nestled in the heart of Edinburgh, in which the 'alternative-substitutional', 'alternative-additional', and 'alternative-oppositional' co-exist. Avoiding notions of anti-capitalist purity or

contamination, furthermore, it acts as a shelter for non-capitalist forms of 'being-in-common' through the pragmatic balancing of the commercial and non-commercial. It is this very balance which enables it to provide space for alternative and de-commodified practices of exchange, labour, and the examination of the 'black boxed' infrastructures and materials of modern life (Table 2).

<table>
<tr><th>Alternative-additional</th><th>Alternative-substitutional</th><th>Alternative-oppositional</th></tr>
<tr><td>Constructing new infrastructures for construction and repair</td><td>Substituting for affordable public or 'back garden' space.</td><td>'Counter-hegemonic practices' of un-black boxing infrastructure and objects.</td></tr>
<tr><td rowspan="2">Providing space to facilitate educational, artistic, and commercial activities.</td><td>Substituting for formal education in practical 'shop class' courses and skills.</td><td rowspan="2">Constituting alternative, diverse and often cooperative economic approaches.</td></tr>
<tr><td>Substituting for a traditional workplace.</td></tr>
</table>

Table 2: Hacklab's Typology of Alterity

The diverse economies perspective usefully breaks down dualistic and capitalocentric mythologies around the maker movement: on the one hand that such workshops are spaces apart from capitalism, and on the other that they are hubs for proto-capitalist innovation. Instead, engagement with practice theory, in turn, allowed a closer understanding of how

these organisations persist and reproduce in the everyday, and to begin to think through what implications these could have for the emergence and spread of counterhegemonic economic practices, now and in the future.

The paper showed the importance of transcending contemporary practice theory's focus on discrete everyday behaviours, to examine the wider context and interrelatedness of practices (see also Schmid, 2018). It also raised intersecting issues regarding power in practice theories, which have too-often ignored uneven patterns of recruitment to practices which are viewed as largely uncontentious (Denegri-Knott et al., 2018). In the Hacklab's case, this most obviously emerged in relation to imbalances in gender and competence. While certain exclusions were acknowledged by (predominantly) male participants at the Hacklab, however, they seemed at a loss as to how to fix it. A reinvigorated practice theory must foreground these complex questions of prefiguration, politics, and the inclusive cultivation of alterity.

Finally, the paper also raises questions regarding the scope, scale, and implications of prefiguration in post-capitalist initiatives. Although undergoing substantial growth over the past decade, maker spaces and other community workshops remain a niche endeavour. Speaking directly to this issue, Hacklab participant Edward spoke eloquently of the 'cascading benefits' of his involvement:

> *I think it will always be a subset [of the population], but that's fine, because I think these things have cascading benefits… Whenever I go back to my parents' house I fix the computers and the TV… I fix all those kind of things, and having space like the Hacklab or maker spaces means that the people who are interested in these things get somewhere where they can*

share this kind of knowledge and these kind of skills with each other.

(Edward)

The idea of evolving skill and cascading benefits reflects how difficult it is to quantify or measure the key implications and outcomes of community workshops. As Smith and Stirling (2016: 14) note, citizens don't "need to become committed members of a grassroots initiative (or start their own), in order to experience these benefits to some extent…even the mere existence of opportunities for less intensive engagements with this kind of material deliberation can open up crucial forms of access to new kinds of capacity." The extent to which expertise, a practice, or a set of competences must become distributed in order to hold implications for resource use and radically shifting the trajectory of contemporary life is thus a crucial consideration. From this study, low-key prefiguration appears to operate through many overlapping ripples of social change, rather than linear causality. Nevertheless, participants are confident about what can be achieved in common. '*Stand back and watch us!*' (DL, quoted in Smith, 2017) was the emphatic response of one Hacklab participant to the idea that there are limits to what Hackers can do, in contrast with more mainstream institutions.

Conclusion: Performing Post-Capitalism

The acts of creating, figuring out, subverting stuff to do things that its designers may not have intended, seem pretty political to me…

(DL, January 2014)

By breaking down a noted division between literatures of post-capitalism and the often apolitical literatures of social practice theory, this paper has focused on how diverse forms

of economic being-in-common are being created in the here and now. Focusing on the case of a city-centre Hacklab, the post-capitalist practices described have constituted a quiet form of activism, grounded in the everyday, rather than the spectacular or extraordinary (Pottinger, 2016). This prefigurative and everyday grounding contributes to a growing evidence base which questions an era of widely perceived 'capitalist realism' (Fisher, 2009) and demonstrates practical economic alternatives – grounded on the pragmatic construction of infrastructural and intellectual commons – which are being constructed from within communities (Gibson-Graham, 2006).

At a time which calls for alternatives which are both sustainable and just, the construction of a commons-based workshop – while imperfect – not only constructs valuable public infrastructure for engagement with making and repair, but widens experience in grassroots democracy, sowing the seeds of a democratic, ecological urbanism. Furthermore, while many of the practices discussed here are currently marginalised in Western societies, they may need to be revived, resurrected, shared or fallen back on amidst turbulent futures (Carr and Gibson, 2015; Maller and Strengers, 2015). These include both the tangible skills of repair, maintenance and construction, but also the social infrastructure of interdependent action and solidarity. Other economies are possible, and their constituent practices are being performed right now.

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[i] Such spaces can be titled in various ways - including hack labs, open workshops and FabLabs - depending on organisational particulars. The fundamental principle of providing access to shared workshop space and equipment, however, remains.

[ii] Internet slang for competence, derived from Kung Fu.